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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,688	12/10/2001	Tadao Endo	35.C16015	9314

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FITZPATRICK CELLA HARPER & SCINTO  
30 ROCKEFELLER PLAZA  
NEW YORK, NY 10112

EXAMINER
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LAM, HUNG H

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/006,688

Applicant(s)

ENDO, TADAO

Examiner

Hung H. Lam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12/10/01.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-18 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

#### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Drawings***

2. Figures 16-17 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Specification***

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5,7-11, 13, 14 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeromin (5,661,309).

With regarding to **claim 1**, Jeromin discloses a radiation image pick-up apparatus comprising:

conversion means for converting radiation into an electrical signal (Figs. 5-6; X-ray image capture panel 16; Col. 3, Ln. 30-44);

accumulation means for accumulating the electrical signal converted by said conversion means (Figs. 5-6; capacitor 6; Col. 6, Ln. 26-30);

read means for reading out the electrical signal accumulated in said accumulation means (Fig. 3; Read out electronic 31; Col. 4, Ln. 40-41; Col. 7, Ln. 4-7);

detection means for detecting start and end of irradiation of the radiation (Fig.1; Sensor 68; col. 4, Ln. 37-38);

a driving circuit for accumulating the electrical signal in said accumulation means responsive to a detection of the start of irradiation of the radiation (Col. 4, Ln. 37-40; when the sensor detects the presence of the X-ray, the plurality of charges is accumulated within the image capture panel 16), and for driving said read means responsive to a detection of the end of irradiation of the radiation is detected, based on a detection result of said detection means (Col. 4, Ln. 40-43; Col. 4, Ln. 47-50; when the sensor (68) detects the absence of the X-ray, the readout electronic 31 produces a plurality of digitized image element values. During this time the ready light (66) is inactive indicating the cassette is not ready to record radiation); and

control means for controlling said driving circuit (Fig. 3; CPU 60; Col. 4, Ln. 30-33; Col. 4, Ln. 49-59).

With regarding to **claim 2**, Jeromin discloses an apparatus wherein said control means stops driving said read means by said driving circuit or an external input when read of the electrical signal by said read means ends (Col. 4, Ln. 27-29; the activate switch 64 of Fig. 1 can be used to stop the read means when the electrical signal by the read means ends; Col. 4, Ln. 30; CPU 60 also causes power to be supplied to image capture panel 16).

With regarding to **claim 3**, Jeromin discloses an apparatus wherein said control means is IC chip circuit (CPU 60 is inherently an IC chip circuit).

With regarding to **claim 4**, Jeromin discloses an apparatus wherein said control means performs idling operation of said conversion means before the accumulation operation (Col. 4, Ln. 27-31; idling operation is interpreted as the time between the CPU supply power to capture panel 16 and when the sensor 68 senses the presence of X-rays radiation).

With regarding to **claim 5**, Jeromin discloses an apparatus wherein the idling operation continues until the start of irradiation of the radiation is detected (ready-light continues to idle/active until the sensor 68 senses radiation and the light (66) is inactive during the period when charges are converted within the readout electronics (31)), and when the start of irradiation of the radiation is detected, said accumulation means is driven to perform accumulation operation (Col. 4, Ln. 37-43).

With regarding to **claim 7**, Jeromin discloses an apparatus further comprising:

an analog/digital converter for converting into a digital signal an electrical signal read out by the read operation and idling operation (Col. 4, Ln. 40-47; Col. 7, Ln. 7-11); and

a memory for storing electrical signals converted by said analog/digital converter (Col. 4, Ln. 44-46; Storage 36).

With regarding to **claim 8**, Jeromin discloses an apparatus wherein said memory includes one of a hard disk, a magneto-optical disk, and a random access memory (Col. 4, Ln. 44-47).

With regarding to **claim 9**, Jeromin discloses an apparatus wherein said memory is loadable/unloadable into/from a main body of the radiation image pick-up apparatus (Col. 4, Ln. 44-47; miniature magnetic or optical digital recorder is inherently removable from the main body of the radiation image pick-up apparatus (20)).

With regarding to **claim 10**, Jeromin discloses an apparatus further comprising a loadable/unloadable battery for driving a main body of the radiation image pick-up apparatus (Fig. 1; Batteries 38; Col. 4, Ln. 2-7; self-contained batteries are commonly loadable / unloadable for the ease of replacement).

With regarding to **claim 11**, Jeromin discloses an apparatus wherein said conversion means comprises:

a wavelength for converting the radiation into light (Fig. 1; front member 23; Col. 4, Ln. 7-15; Fig. 5; layer 9; Col. 7, Ln. 60-62; member 23 and layer 9 receive x-ray radiation); and

photoelectric conversion means for converting the light converted by said wavelength into an electrical signal (Figs. 5-6; inner microplate 4n, outer microplate 18n and photoconductive layer 8; Col. 5, Ln. 58-67 – Col. 6, Ln. 1-30; Col. 7, Ln. 46-54).

With regarding **claim 13**, Jeromin discloses the same subject matter as claimed in claim 1. Further more, Jeromin discloses an apparatus wherein said conversion means and said read means contain amorphous silicon and are formed by the same step (Fig. 5; Col. 6, Ln. 35-53; see other publications cited by Jeromin in page 1).

With regarding to **claim 14**, Jeromin discloses the same subject matter as claimed in claims 1 and 11. Further more, Jeromin discloses an apparatus wherein said wavelength converter is disposed at a position in tight contact with said photoelectric conversion means (see the constructions of the wavelength converter/ font member 23 of Fig. 1 and layer 9 of Fig. 5).

With regarding to **claim 18**, Jeromin discloses the same subject matter as claimed in claim 1. Further more, Jeromin discloses a radiation image pick-up system comprising: a radiation image pick-up apparatus (Figs. 1-2C; image pickup apparatus 20); and a radiation source for emitting radiation to said radiation image pick-up apparatus (Figs. 2A-2C; radiation source 44).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeromine.

With regarding to **claim 12**, Jeromin discloses the same subject matter as claimed in claim 1. However, Jeromin fails to disclose an apparatus wherein said conversion means contains one material selected from the group consisting of lead iodide, mercurous iodide, selenium, cadmium telluride, gallium arsenide, gallium phosphide, zinc sulfide, and silicon for directly converting the radiation into an electric charge.

Official Notice is taken that it is well known and expected in the art that photoconductive materials are formed from the group consisting of lead iodide, mercurous iodide, selenium, cadmium telluride, gallium arsenide, gallium phosphide, zinc sulfide, and silicon can be used as the absorbing layer for X-RAY radiation. Therefore, it would have been obvious to one of ordinary skill in the art to select one of the photoconductive materials from the list above for the conversion means of Jeromin in order to convert the radiation into electrical charges with a highly effective x-ray absorbing layer.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeromine in view of Taskar (US-2002,0,074,929).

With regarding to **claim 15**, Jeromin discloses the same subject matter as claimed in claims 1 and 11. However, Jeromin fails to disclose an apparatus wherein said wavelength



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converter contains one material selected from the group consisting of Gd.sub.2O.sub.2S, Gd.sub.2O.sub.3, and CsI as a major component. However, the limitations are well known in the art as taught by Taskar.

In the same field of endeavor, Taskar teaches a high resolution phosphor screen sensor wherein a variety of commercially available phosphors comprising: Gd.sub.2O.sub.2S, Gd.sub.2O.sub.3, and CsI may be doped with europium, terbium, and thulium in order to generate RGB light [0032]. In light of the teaching from Taskar, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Jeromin to include Gd.sub.2O.sub.2S, Gd.sub.2O.sub.3, and CsI as a major component in order to construct an RGB phosphor screen and thereby provide a color display of X-ray energy distribution [0032].

9. Claims 16 and 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeromine in view of Tsukamoto (US-5,818,898).

With regarding to **claim 16**, Jeromin discloses a method of driving a radiation image pick-up apparatus for obtaining image information by converting radiation which irradiates an object to be examined into an electrical signal by a conversion element for converting the radiation into an electrical signal (Figs. 2A-2C; X-RAY source 44, patient 48, image pickup apparatus 20), comprising steps of:

an accumulation operation of detecting start of irradiation of the radiation and accumulating the converted electrical signal (Col. 4, Ln. 37-40; when the sensor detects the presence of the X-ray, the plurality of charges are accumulated within the panel 16);

a read operation of detecting end of irradiation of the radiation and reading out the accumulated electrical signal (Col. 4, Ln. 40-43; Col. 4, Ln. 47-50; when the sensor (68) detects the absence of the X-RAY, the readout electronic 31 produces a plurality of digitized image values. During this time the light (66) is inactive indicating the cassette is not ready to record radiation).

However, Jeromin fails to disclose a method of driving a radiation image pick-up apparatus comprising steps of:

an idling operation of performing idle read of the conversion element before the accumulation operation.

In the same field of endeavor, Tsukamoto teaches an X-RAY imaging device wherein the digital data H1 of one frame<sup>is</sup> outputted before X-rays emission is on (Fig. 20; Col. 13, Ln. 55-58). Tsukamoto further teaches that the case where the X-rays are emitted for a time interval longer than one frame period, digital data H1-H7 of successive frames are stored in memories and summed up to form a frame (Col. 13, Ln. 60-67 – Col. 14, Ln. 1-9). In light of the teaching from Tsukamoto, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Jeromin to perform the idle read operation before the accumulation operation in order to improve the versatilities of the X-ray imaging device having X-rays emission for any desired period of time.

With regarding to **claim 17**, Jeromin in view of Tsukamoto discloses a method further comprising a step of an operation of adding frame data in the idling operation immediately before the accumulation operation (Tsukamoto; frame data H1 in idling operation) and frame data in the read operation (Tsukamoto; frame data H2-H7 in reading operation), and a step of outputting a sum as an image (Tsukamoto; Fig. 20; Col. 13, Ln. 60-67 – Col. 14, Ln. 1-9).

*Allowable Subject Matter*

10. Claim 6 is objected to as being dependent upon a rejected base claims, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With regarding to **claim 6**, the following is a statement of reason for the indication of allowance: the prior art made of record and considered pertinent to the applicant's disclosure does not disclose nor fairly suggest the apparatus of claim 5 further in combination with: **wherein an operation time Ta of the idling operation and a time Tr for driving said read means in order to read out image information satisfy  $Tr \geq Ta$ .**

*Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a) Spivey (US5,886,353) discloses an imaging device wherein Lead iodide, Cadmium telluride, Zinc Sulfide, Selenium are used for X-RAY radiation absorbing layer.

b) Trauernicht (US-5,753,921) discloses an X-RAY imaging detector wherein Silicon, and Mercurous iodide are one of the suitable material for X-RAY detection.

c) Mauk (US-6,429,463) discloses semiconductor device wherein gallium arsenide and gallium phosphide are described as one of the radioactive material.

d) Hull (US-6,339,633) discloses an automatic exposure initiation in a digital CCD camera X-RAY imager.

e) Tashiro (US-6,801,598) discloses a radiation sensing device wherein the imaging device captures radiation image in according to X-RAY detection sensor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung H. Lam whose telephone number is 571-272-7367. The examiner can normally be reached on Monday - Friday 8AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary, NGOC YEN VU can be reached on 571-272-7320. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

05/31/05

HL



NGOC-YEN VU  
PRIMARY EXAMINER